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〔12〕**实用新型专利申请说明书**

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〔54〕实用新型名称　蓄电池充、放电自动控制装置

〔57〕摘要

　　本实用新型公开了一种蓄电池充、放电自动控制装置，主要由电压取样电路、电子放大电路、状态维持记忆电路及执行机构、状态显示器等组成。其特点是采用电子线路，对蓄电池的充、放电程度进行自动控制，可以有效地避免蓄电池过量充电、充电不足或过量放电情况的发生，确保蓄电池于最佳状态，有利于节约电能和延长蓄电池的使用寿命。
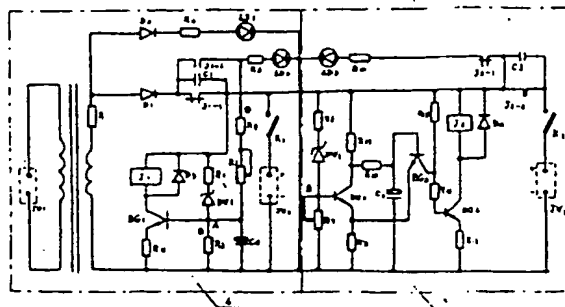
1. 一种包含有机壳[1]、面板[2]、线路安装板[3]的蓄电池充、放电自动控制装置，其特征在于电子电路由充电自动控制电路[4]和放电自动控制电路[5]组成：

a. 所述的充电自动控制电路[4]中有充电电压取样电路[DW1、R1、R2]、电子放大电路[BG1、R11]、停止充电状态维持记忆电路[R9、R3、C4、J1、J1-2]、停止充电执行机构[J1、J1-1、C1]及状态显示电路[LD2、R5]；

b. 放电自动控制电路[5]中有放电电压取样电路[DW2、R6、R7]、电子放大及放电状态维持记忆电路[BG2、BG3、BG4、R8、R13、R14、R15、R16]、停止放电执行机构[J2、J2-2、C3]及状态显示电路[LD3、R10]。

2. 根据权利要求1所述的蓄电池充、放电自动控制装置，其特征是充电饱和拐点电压高于蓄电池标称电压值的32-35%。

3. 根据权利要求1所述的蓄电池充、放电自动控制装置，其特征是放电终了电压低于蓄电池标称电压值的12-15%。

蓄电池充、放电自动控制装置

本实用新型涉及一种电子自动控制装置，特别是一种适用于蓄电池充、放电的装置。

通常，蓄电池的充、放电终期状态可分别用测定蓄电池的电压值、电解液比重或电池累计容量变化等方法来加以判定，但是具体使用时，特别是频繁使用时相当不方便。所以，人们习惯上以实际充、放电的时间作为终期判定的依据，例如汽车和电瓶车中所用的蓄电池都以２４小时常规充电时间为标准。这种方法虽方便可行，但是由于用户很难控制使蓄电池处于最佳工作状态，使用时或者会造成蓄电池过量充电，或者会造成充电不足及过量放电。而蓄电池过量充电，既浪费电能，又容易损坏极板；充电不足，则蓄电池的容量减小；过量放电，也会影响蓄电池的使用寿命。

本实用新型的任务是要提供一种电子自动控制装置，它能够方便地自动控制蓄电池的充、放电程度，从而确保蓄电池处于最佳的工作状态。

本实用新型是这样实现的：根据蓄电池充、放电特性曲线的充电饱和拐点和放电终了电压特性，采用电子线路对蓄电池的充放电程度进行自动控制。电子控制线路主要由充电自动控制电路和放电自动控制电路两大部分组成。各控制电路内又分别包含有电压取样电路、电子放大电路、状态维持记忆电路及执行机构等。电子元件可以采用分立元件，也可以采用集成化电路。执行机构可以采用继电器。当进行充电作业时，电压取样电路跟随蓄电池极板间的电压工作，当蓄电池电压被充到饱和拐点值（高于蓄电池标称电压值的３２－３５％）时，取样电路驱动放大电路工作，其结果驱动执行机构切断充电电源，停

止充电作业。此时，状态维持记忆电路确保放大电路保持工作，充电电流取样电路不起作用，所以在蓄电池停止充电后，虽然蓄电池端电压立即下降低于饱和拐点电压，但不会再重复充电操作。同样，在放电状态下，当蓄电池的工作电压下降到终了电压值（低于标称电压值的12%－15%）时，取样放大电路驱动执行机构切断输出电路，停止放电。此时，状态维持记忆电路保证放大电路保持工作，放电电压取样电路也不起作用，所以，在蓄电池停止放电后，蓄电池端电压虽随之回升，但不会再重复放电操作。此外，本实用新型还可分别或同时设置声报警、光状态指示器，以直观、确切地反映蓄电池的即时工作状态。

本实用新型具有自动、确切地控制蓄电池充、放电程度的功能，使之既方便、安全、可靠，又可确保蓄电池工作于最佳状态，有利于省的电能和延长蓄电池的使用寿命；电路结构比较简单，无论是采用分立元件或集成化电路，成本均很低；应用面广，对于铅蓄电池，无论其容量大小，标称电压高低，均可使用本控制装置进行充、放电程度自动控制，使其工作于最佳状态，可以广泛地使用在任何以铅蓄电池作为动力源的场合，其中包括逆变电源和直流电源中。

本实用新型的典型实施例如附图所示。下面结合附图作进一步详细说明。

图2是本实用新型的结构示意图。

图1是本实用新型的电气原理图。

参阅图1，控制装置主要由机壳〔1〕，面板〔2〕及线路安装板〔3〕组成。面板〔2〕上安装有供手动控制用的蓄电池开关K1、直流放电开关K2，充电状态指示灯LD1、电充足指示灯LD2、电放尽指示灯LD3，交流电源插头JW1、蓄电池连接插座JW2和直流放电输出插座JW3。线路安装板〔3〕安装有图2中所示的除面板〔2〕上所安装的以外的其余电子元器件。

4

参阅图2，电路主要由充电自动控制电路[4]和放电自动控制电路[5]两大部分组成。

充电自动控制电路主要组成有：由交流电源插头ＪＷ１、交流电源变压器Ｔ及限流电阻Ｒ组成的交流电源输入电路；由整流二极管Ｄ２、电阻器Ｒ４及发光二极管ＬＤ１组成的充电状态显示电路；由整流二极管Ｄ１、常闭触点Ｊ１－１、蓄电池开关Ｋ１及蓄电池连接插座ＪＷ２组成的充电电路；由稳压管ＤＷ１、电阻器Ｒ１、Ｒ２组成的充电电压取样电路；由三极管ＢＧ１、电阻器Ｒ１１组成的电子放大电路；由继电器Ｊ１、常闭触点Ｊ１－１及电容器Ｃ１组成的停止充电执行机构；由电阻器Ｒ９、Ｒ３、电容器Ｃ４、继电器Ｊ１及常开触点Ｊ１－２组成的停止充电状态维持记忆电路；由发光二极管ＬＤ２、电阻器Ｒ５组成的电充足状态显示电路。

放电自动控制电路主要组成有：由稳压管ＤＷ２、电阻器Ｒ６、Ｒ７组成的蓄电池放电电压取样电路；由三极管ＢＧ２、ＢＧ３、ＢＧ４、电阻器Ｒ８、Ｒ１３、Ｒ１４、Ｒ１５及Ｒ１６组成的放大、状态维持记忆电路；由常开触点Ｊ２－２、放电开关Ｋ２、直流放电输出插座ＪＷ３组成的放电电路；由继电器Ｊ２、常开触点Ｊ２－２及电容器Ｃ３组成的停止放电执行机构；由常闭触点Ｊ２－１、发光二极管ＬＤ３、电阻器Ｒ１０组成的电放尽状态显示电路。

当进行充电操作时，插上交流电源插头ＪＷ１，发光二极管ＬＤ１亮，表示电源接通；合上蓄电池开关Ｋ１，即开始对蓄电池进行充电作业。当蓄电池被充电到高于蓄电池标称电压值的３２－３５％（即饱和拐点电压）时，随之上升的Ａ点取样电压使ＢＧ１导通；Ｊ１开始工作，Ｊ１－１断开，切断充电电源；ＬＤ２亮，表示蓄电池电已充足；Ｊ１－２闭合，使ＢＧ１保持导通，电压取样电路不起作用，使电路状态维持在停止充电状态。当进行放电操作时，将负载插头插入ＪＷ３，合上放电开关Ｋ２，蓄电池便作为直流电源进行正常放电

此时，ＢＧ４导通，Ｊ２工作，Ｊ２－１断开，Ｊ２－２闭合，电路有电流输出。当蓄电池放电到低于标称电压值的１２－１５％（终了电压）时，Ｂ点取样电压的下降使ＢＧ２截止，ＢＧ３导通，ＢＧ４截止，使Ｊ２停止工作。Ｊ２－２断开，切断负载电路，停止放电作业；Ｊ２－１闭合，ＬＤ３亮，表示该蓄电池电已放尽，或表示该蓄电池须重新充电后才可继续使用。

图 1
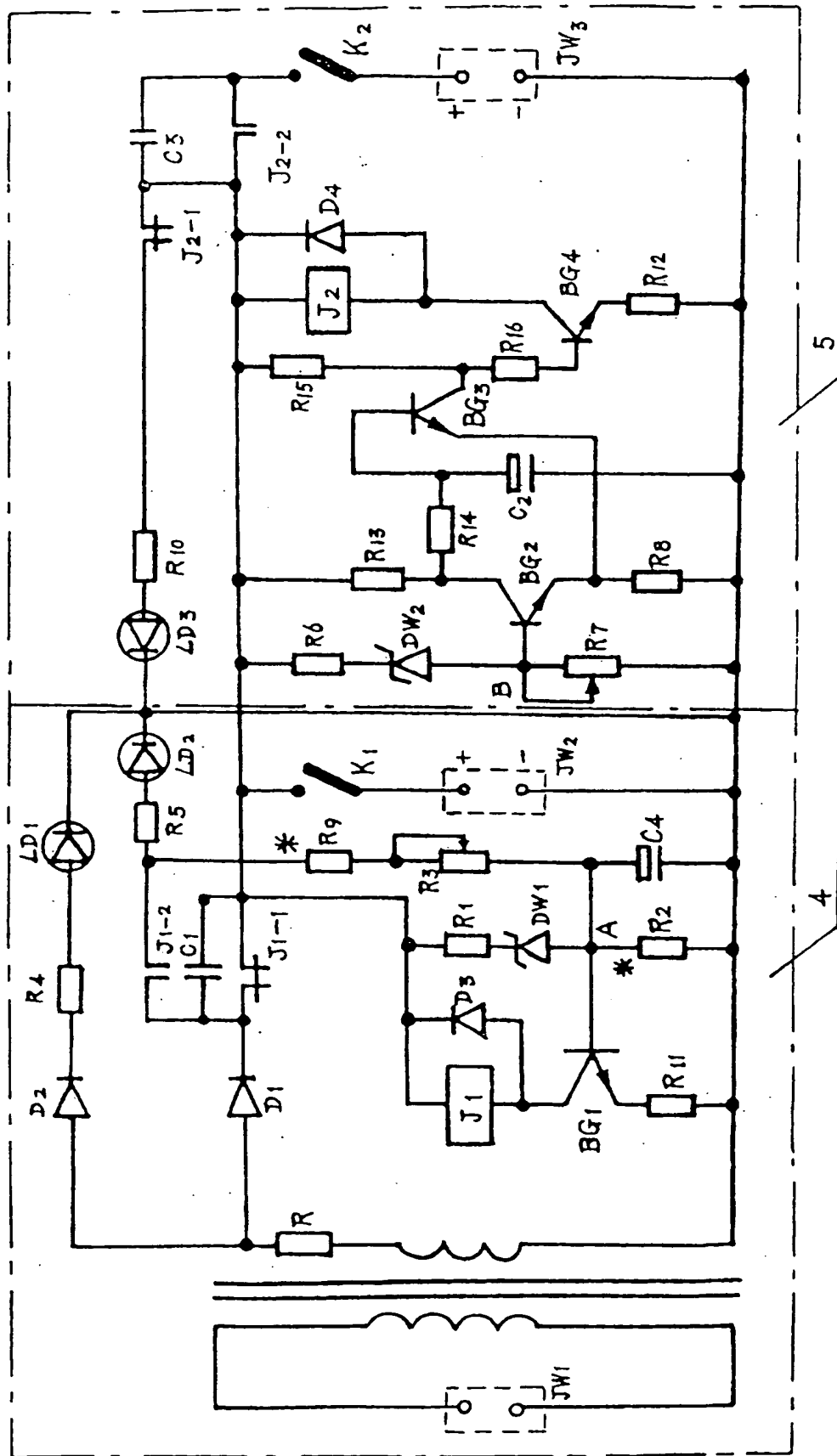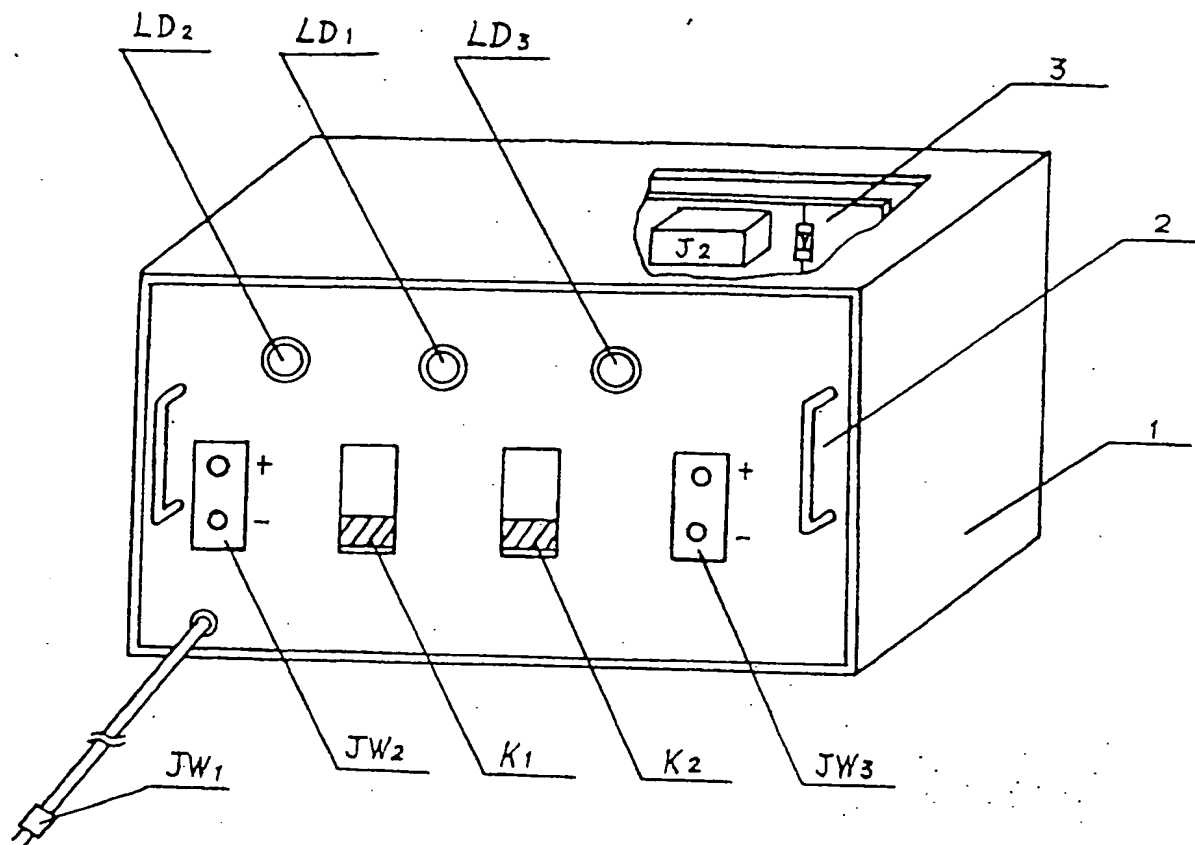
LD₂ LD₁ LD₃ 3

J₂ 2

1

JW₁ JW₂ K₁ K₂ JW₃

图 2

Computer Screen for Displaying Correspondent
Gregorian and Lunar Calendars and Clock

The present utility model relates to a digital timing device capable
of automatically and simultaneously displaying the Gregorian and
Lunar calendar dates and time, and particularly to a computer
screen for displaying correspondent Gregorian and Lunar calendars
and Clock.

Some of the currently commercially available display devices can
only display the Gregorian calendar and days of a week but not the
Lunar calendar, and some of them require adjustment for Lunar
month of 30 or 29 days and thus cause inconvenience in use.

The present utility model provides a device having all the functions
of conventional calendar and clock, the display screen of which is
capable of displaying correspondent Gregorian and Lunar calendar
dates without the need of any artificial adjustment after it has been
powered, set the data of the date (year, month, date) and time with
the buttons and started.

The present utility model comprises a housing 10 and an electronic
circuit 11, wherein a display screen 12 is provided on the
front-panel of the housing 10, data control buttons 1, 2, function
buttons 3, 4, an execution button 5, and a reset button 6, as well as
a switch 9 are provided on the side surface of the housing 10; an
external appliance socket 7, a battery switch 8 and power supply
lines 18 are provided in the rear of the housing; the electronic
circuit 11 is provided inside the housing 10; the electronic circuit 11
comprises a data calculation processing system I, a data
transmission and display system II, a stabilized power supply III,
and a voice time reporting and external appliance inter face system

1

IV; the data calculation processing system I comprises, as its main body, a single chip computer 80C31 provided with a program memory 27C64, a data memory 27C64, an interface circuit 82C55, an 8-line decoder 74 HC138, and an 8D latching tristate output

5   circuit 74HC373, and is connected to the buttons 1, 2, 3 and 4 via the interface circuit 82C55, the micro-computer 80C31 displays the numerals on the display screen 12 via the decoding drive circuit in the data transmission and display system II, the 8-bit output of the Port P_0 of the micro-computer 80C31 is connected to the input of

10   the 8D latching tristate output circuit 74HC373, the program memory 27C64 and the 8 bit data terminal of the programmable parallel input interface 82C55, the output of the micro-computer 80C31 is connected to the decoder 74HC138 and the 8D latching tristate output circuit 74HC373; a correspondence table of the

15   Gregorian calendar and the Lunar calendar and calculation formulae are fired in the data memory 27C64 in the data calculation system I; the voice time reporting and external appliance interface system IV comprises an external appliance interface circuit including integrated circuit modules CD4069,

20   CD4013 and CD4060, and a voice time reporting circuit including integrated circuit modules CD4081, 74HC74 and CD4098.

Detailed description of the embodiments:

Fig.1 is a perspective diagram of the utility model;

25   Fig.2 is a top view of the utility model; and

Fig 3 is an electric diagram of the utility model.

Referring to Fig. 1, a display screen 12 at the front of the housing 10 displays "1993, Gregorian Calendar March 4.th, Thursday,

30   Lunar Calendar Feb. 12th, and AM, PM, 8:30 ", there are buttons 1 to 6 and a switch 9 on the side thereof, the switch is only used once when switching from 1999 to 2000. Referring to Fig. 2, an external

2

appliance socket 7, a battery switch 8, and power supply lines 13 are provided at the rear of the housing 10, the socket 7 is used for controlling the ON/OFF times, and when the battery switch is pushed to the left, it is turned on and the device is charged when

5   there is an AC current, and it is powered by the battery when there is no AC current, power supply lines 13 are also provided on the housing. Referring to Fig.3, the data calculation processing system I, with a single chip micro-computer 80C31 as its main body, is provided with a program memory 27C64, a data memory 27C64, an

10   interface circuit 82C55, an 8-line decoder 74HC138, and an 8D latching tristate output circuit 74HC373. The data memory stores calculation programs and a correspondence table of the Gregorian Calendar and the Lunar Calendar, when the computer counts to 24 hours, a carry processing of the date is performed, and the

15   Gregorian and Lunar Dates of the current day are given with reference to the correspondence table, the computer displays the numerals of the results of calculation on the number tubes of the display screen via the decoding drive circuit in the data transmission and display system II. Relevant data and commands

20   are set by the buttons 1 to 4 after powered, and the display screen 12 operates automatically after started. The whole system is supplied with DC current by the stabilized power supply III,

The connections among the electrical components of the present

25   utility model are shown in Fig. 3, and the operation principles thereof are as follows: a correspondence table of the Gregorian Calendar and the Lunar Calendar and calculation formulae are firmed in the data memory 27C64 in the micro-computer system, when the system is powered, the pulse signals generated by the

30   oscillator in system IV enter the micro-computer 80C31 as input signals and second pulse signals, the 8-bit of the port P_o of the micro-computer 80C31 is connected to the input of the 8D latching

tristate output circuit 74HC373, and also connected to the 8-bit data terminals of the program memory 27C64 and the programmable parallel input-output interface 82C55. The output of the micro-computer 80C31 is connected to the 3-line-8-line decoder 74HC138 and the 8D latching tristate output circuit 74HC373. Each of the outputs (inputs) of the programmable parallel input-output interface circuit 82C55 is connected to the positive pole of the power supply of system II via a 470KΩ resistor, the lower 4 bits (P_{A3}-P_{A0}) of the port P_A thereof are connected to the terminals D, C, B and A of the latching decoding driver CD4511, and the higher four bits (P_{A7}-P_{A4}) are connected to the terminals D, C, B and A of the latching 4-line-16-line decoder CD4514. Each of the latching decoding driver drives 17 light emitting number tubes, respectively, for displaying on the display screen 12, each of the output of the latching 4-line-16 line decoder CD4514 controls relative power amplifier, respectively. After the data is inputted by the buttons 1, 2, 3 and 4, the computer performs calculations of suitable instructions selected according to the data values inputted with the buttons, and gives out the information of year, month, and date of the Gregorian and Lunar Calendars as well as hour, minute, and day of a week, and respective number tubes are controlled on the display screen 12 by the decoding circuit to display the numeric values. The lower five bits (P_{14}-P_{10}) of the port P_1 of the micro-computer in system I are used for outputting instructions for initiating the display screen 12 of Gregorian and Lunar Calendars and the clock, and delivering voice control and time reporting on the hours. The operation procedure thereof are: the circuit CD4060 connected to crystal oscillator (32768 HZ) obtains the second signals via the CD4013 after multiple frequency dividing, the second signal is connected to terminals 14 and 15 of 80C31 from the terminals 5 and 7 of the CD4060, and to terminals 9 and 12 of 80C31 from the terminals 2, 3 and 8 of CD4069, after inverted by

the CD4069 circuit. The above-mentioned three circuits constitute the second generation and clock control, which cause the normal operation of the clock and date by communicating with 80C31. The terminal 11 of CD4098 (see bottom right of Fig. 3) is connected to

5 terminal 5 of 80C31 for triggering CD4098 via 80C31 on the hours, the terminal 9 of CD4098 controls the voice time reporting chip via a transistor to report time with the Chinese language.

An external appliance control circuit is formed by connecting

10 terminal 5 of CD4081 with terminal 3 of 80C31 and terminals 4 and 10 of 74HC74 with terminals 2 and 4 of 80C314, respectively. A user may program with the buttons 1, 2, 3 and 4 to connect the 80C31, CD4081 and 74HC74 with each other, and output from terminal 9 of 74HC74, the external appliance may be turned on and off at times

15 specified by the user through controllable silicon to perform control function of external appliance.

The test and adjustment steps are as follows (Figs. 1 and 2):

20 1. Turn on the AC power supply and the stand-by battery power supply (switch No.8) after a visual examination.

2.Performing the following tests and adjustments at the first power-on time or if necessary (it is not necessary when operating

25 normally).

The tests and adjustments are mainly performed by operating the switches on the machine. The switches comprise four digits and 2×4 buttons (each digit including 2 buttons: one "+" and one "-"),

30 wherein the buttons 1 and 2 are data buttons, 3 and 4 are function buttons, 5 is a set button and 8 is a reset button.

The definitions of the function buttons are as follows:

Button 3	Button 4	Function
0	0	automatically find out the month and date of the Lunar calendar and day of the week after setting the year, month and date of the Gregorian calendar
0	1	allowing setting the minute of the clock using the data buttons
0	2	allowing setting the hour of the clock using the data buttons
0	3	allowing setting the date of Gregorian calendar using the data buttons
0	4	allowing setting the month of Gregorian calendar using the data buttons
0	5	allowing setting the year of Gregorian calendar using the data buttons
0	6	allowing setting the minute for time reporting using the data buttons
0	7	allowing setting the hour for time reporting using the data buttons
0	8	allowing setting the minute for controlling the turn on of the external appliance
0	9	allowing setting the hour for controlling the turn on of the external appliance
1	0	allowing setting the minute for controlling the turnoff of the external appliance
1	1	allowing setting the hour for controlling the turnoff of the external appliance
1	2	canceling the function of controlling external appliance
1	3	canceling the function of time reporting on the

6

		hours
1	4	increment the calendar by one day
1	5	increment the time reporting on the hours by one hour

button 6 is the reset button.

In operation, the button 5 shall be operated after setting the buttons 1, 2, 3 and 4, then the set numbers will be displayed immediately by the corresponding number tubes.

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Example of adjustment and setting:

1. Setting the time information: for example the time to be set is "3:36 PM (i.e., 16:36), May, 1, 1993", the operation steps and the

10   data set by each button are as follows:

Buttons 1 2 3 4

Operation 1: 3 5 0 1   set buttons 1, 2, 3, 4 to 3, 5, 1, 0 and press button 5 to set the data

2: 1 5 0 2   set buttons 1, 2, 3, 4 to 1, 5, 0, 2 and press button 5 to set the data

15   3: 0 1 0 3   set buttons 1, 2, 3, 4 to 0, 1, 0, 3 and press button 5 to set the data

4: 0 5 0 4   set buttons 1, 2, 3, 4 to 0, 5, 0, 4 and press button 5 to set the data

5: 9 3 0 5   set buttons 1, 2, 3, 4 to 9, 3, 0, 5 and press button 5 to set the data

6:     0 0   set buttons 1, 2, 3, 4 to   0, 0 and press button 5 to set the data

20   After the sixth operation step, the correspondent month and date of the Lunar Calendar as well as the day of the week will be automatically displayed, that is, "Intercalary March, 10, Saturday".

2. The test and adjustment of time reporting on the hour; press the button 5

25   repeatedly after setting the buttons 3 and 4 to 1 and 5, until an o'clock number is reported, thereafter, correct number on the hour will be reported automatically,

Besides the buttons 1 to 6 on the display screen, there are power supply lines 13, an appliance socket 7 and a battery switch 8. When the switch is pushed to the left, the battery can be charged if there is AC current, and the device

5 will be powered by the battery if there is no AC current, but at this time, the clock can only be maintained to operate without any displaying. It can resume displaying when the AC power is recovered. The switch 9 is used only once at the end of 1999 to change the year from the 20th century to the 21st century.

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In summary, the advantages of the present utility model as compared with the prior art computer calendar clock or display screen are as follows:

1. The present utility model has the function of automatically displaying the

15 Lunar Calendar correspondent to the Gregorian Calendar and days of the week, while the prior art computer calendar clock or display does not possess this Lunar Calendar displaying function;

2. The month of 31, 30, 29 or 28 days and the intercalary month of the

20 Gregorian and Lunar Calendar and the days of the week can be displayed automatically without need for artificial adjustment, while the existing computer calendar clocks or display screens need to be adjusted artificially for the month of 31, 30, 29 or 28 days, especially for the intercalary month once four years:

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3. It has the function of voice time reporting, while ordinary computer calendar clocks have not.

4. The display screen continues to operate when the commercial power stops

30 supplying, and the displaying of the current time and date will be resumed automatically when the commercial power is recovered, while ordinary computer calendar clock or display screen is incapable of doing so.

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Therefore, the present utility model is convenient to use, complete in functions, the electronic components used are all commercially available, and the cost is low.

What is claimed is:

1. A computer controlled display screen for digitally displaying correspondent Gregorian and Lunar calendar clock, comprising a housing 10 and an electronic circuit 11, characterized in that: a display screen 12 is provided on the front-panel of the housing 10, data buttons 1, 2, function buttons 3, 4, an execution button 5, a reset button 5 and a switch 9 are provided on the side surface of the housing 10, an external appliance socket 7, a battery switch 8 and power supply lines 13 are provided in the rear of the housing 10, and an electronic circuit 11 is provided inside the housing 10.

2. The display screen according to claim 1, characterized in that: said circuit 11 comprises a data calculation processing system I, a data transmission and display system II, a stabilized power supply III, and a voice time reporting and external appliance interface system IV, said data calculation processing system I includes a single chip micro-computer 80C31 as its main body and is provided with a program memory 27C64, a data memory 27C64, an interface circuit 82C55, an 8-line decoder 74HC138, an 8D latching tristate output circuit 74HC373, and is connected to the buttons 1, 2, 3 and 4 via the interface circuit 82C55, the micro-computer displays numerals on the display screen via the decoding drive circuit of the data transmission and display system II, the 8-bit output of the port P_0 of the micro-computer 80C31 is connected to the input of the 8D latching tristate output circuit 74HC373 and to the data terminals of the program memory 27C64 and the interface circuit 82c55, the output of the micro-computer is connected to the decoder 74HC138 and the 8D latching tristate output circuit 74HC373.

3. The display screen according to claim 2, characterized in that: a correspondence table of the Gregorian and Lunar Calendars and calculation formulae are firmed in the data memory 27C64 in the data calculation processing system I.

4. The display screen according to claim 2, characterized in that: said voice time reporting and external appliance interface system IV comprises an external appliance interface circuit including integrated circuit modules CD4089, CD4013 and CD4060 and a voice time reporting circuit including
5   integrated modules CD4081, 74HC74 and CD4098.

Abstract

The present utility model provides a computer controlled calendar and clock display screen which includes Gregorian and Lunar Calendar correspondence, automatic Chinese language time reporting on the hours, and outputting control function at arbitrarily set on/off times, as well as all the functions of ordinary calendar and clock. The display screen comprises a housing and an electronic circuit, a display screen is provided on the front panel of the housing, buttons and a switch are provided on the side surface of the housing, an external appliance socket and a battery switch are provided in the rear of the housing, and the electronic circuit is arranged inside the housing. This display screen has all the functions of the calendar and clock, it is convenient to adjust, and especially has the advantage of displaying the Gregorian and Lunar Calendar, once started, it is capable of automatically running in correspondence, without the need of any artificial adjustment.